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IN THE UNITED STATES DISTRICT COURT

DISTRICT OF UTAH

UNITED STATES OF AMERICA, Plaintiff, v. DESMOND JORDAN, Defendant.	NOTICE OF INTENT TO RELY ON EXPERT TESTIMONY Case No. 2:19-cr-00125-CW Hon. Clark Waddoups
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Desmond Jordan, through undersigned counsel and pursuant to Federal Rule of Criminal Procedure 16(b)(1)(C), hereby offers the following notice of his intent to rely on expert testimony from Dr. Mary E. Cablk at his suppression hearing on March 3, 2020.

Dr. Cablk is an expert in the science of K9 detection and the training of detection dogs and handlers. A copy of Dr. Cablk's report and *curriculum vitae* are attached as Exhibit A. At the hearing, Dr. Cablk will testify consistent with her report. Specifically, Dr. Cablk will offer the following opinions related to this case:

- The K9 "Tank" did not perform an indication to the odor of narcotics in this case.
- The alerts that Officer Moore report are not specific to narcotics odor.

- The description of the sniff in Officer Moore’s report does not match what can be seen in the body-worn camera surveillance footage of the dog sniff.
- The K9 “Tank” suffered from medical conditions that caused pain and discomfort that would be expected to affect his performance. In fact, training records indicate that the K9 “Tank” was showing manifestations of his underlying medical issues. The fact that he had a serious, underlying medical issue that affected his work performance makes him unreliable.
- The UT POST narcotics certification lacks the rigor and controls needed to be considered a valid assessment.
- The UT POST K9 Narcotics training program lacks currency and presents material that is outdated and incorrect.

Dr. Cablk’s conclusions are based on her training, experience, and review of case materials (listed on p. 15 of her report).

Dated this 20th day of February, 2020.

/s/ Emily Stirba
EMILY STIRBA
Assistant Federal Public Defender

A

Expert Opinion

United States v. Desmond Jordan

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Overview of the Case

On 2/28/2019 West Valley Police Detective D. Allen (hereafter “Detective Allen”) conducted a traffic stop at 4600 West 4100 South in Salt Lake City, Utah. This is the date provided on the incident report, although the body worn camera video is date stamped 2019-03-01. Detective Allen stopped the vehicle for speeding and because he observed the driver was not wearing a seat belt. He had been watching a house in the area suspected of narcotics distribution and he observed this vehicle leave that residence. Detective Allen requested a K9 unit and West Valley Police Officer Clinton Moore (hereafter “Officer Moore”) responded with his K9 “Tank”. Detective Allen’s body camera recorded video of the sniff, because Officer Moore was not yet on duty when he responded to the call for service according to his report. Officer Moore stated that he conferred with Detective Allen when he arrived on scene prior to deploying the K9, and that Detective Allen told him that there was reason to believe narcotics were present in the vehicle. After directing the K9 “Tank” to sniff the vehicle Officer Moore reported to Detective Allen that he believed the dog smelled narcotics odor based on the dog’s behavior (alerts). Officer Moore’s written report stated that “Tank” was trained to do a sit or a down in the presence of drug odor. His report stated that there are three levels of alerts, including the trained indication (sit or down), and that they never occur unless “Tank” smells odor of illegal narcotics. A search of the vehicle yielded a firearm and narcotics paraphernalia and narcotics.

My task per counsel was to review the documentation pertaining to the K9 “Tank” and the incident in question, and offer an opinion about:

- the alleged indication by K9 “Tank”;
- the reliability of the K9 “Tank”;
- the Utah POST K-9 Program Narcotics Detector Dog Training Program (hereafter, “POST manual”)

Opinion

Having reviewed the information and documents available and provided to me, I find the following:

1. The K9 “Tank” did not perform an indication to the odor of narcotics.
2. The alerts that Officer Moore report are not specific to narcotics odor.
3. The description of the sniff in Officer Moore’s report does not match what can be seen in the video.
4. The K9 “Tank” suffered from medical conditions that caused pain and discomfort that would be expected to affect his performance. In fact, training records indicate that the K9 “Tank” was showing manifestations of his underlying medical issues. The fact that he had a serious, underlying medical issue that affected his work performance makes him unreliable.
5. The UT POST narcotics certification lacks the rigor and controls needed to be considered a valid assessment.
6. The UT POST K9 Narcotics training program lacks currency and presents material that is outdated and incorrect.

Basis and Reasons for the Opinions

A. *The vehicle sniff from the video*

i. *The supplement report from Officer Moore is inconsistent with the video*

The video is taken from the body camera of Detective Allen. The date stamp on the video does not match the incident report, where the video is dated 2019-03-01 and the incident report states 02/28/19. In the video Officer Moore can be seen to approach the vehicle from the rear and deploy K9 “Tank” at the trunk of the vehicle. This contradicts Officer Moore’s report, which states he started at the front driver side of the vehicle and “eventually continue[d] his search towards the rear of the vehicle.” Officer Moore reported that upon *starting* at the front driver side, “Tank” began to show alerts. His account of the sniff as he wrote in his report and what can be seen in the video continue to diverge.

Officer Moore’s report states that when “Tank” “eventually” reached the trunk of the car, he “actively sniffed the trunk seam with his head moving in a quick back and forth motion.” He stated, “these types of alerts are what is observed when Tank is actively working the trail of the odor, attempting to locate the odors point of origin.” This is not what can be seen in the video, rather the video shows “Tank’s” head under the rear of the vehicle, shows that he lifts his head up briefly above the trunk, and then moves around the passenger side of the vehicle. At no time can K9 “Tank” be seen to do what Officer Moore reports at the trunk of the car.

As “Tank” then moved in a counterclockwise direction on the passenger side of the vehicle, sniffing lower towards the ground, he turns back to the rear of the vehicle, sniffs the license plate, sniffs the ground and leaves the rear of the vehicle on his own. “Tank” sniffs the passenger front door handle and walks off of the vehicle. Officer Moore circles him back and redirects him to the car. Officer Moore begins to point to the vehicle to direct “Tank” to sniff it, although “Tank” has already completed one pass of the passenger side at this point. They move quickly past the front of the car and down the driver’s side. “Tank” does not stop at the driver’s door, but he can be seen to stop at the left rear of the car, and at this point in the video he sniffs below the rear bumper (as before on the first pass), and then high above the trunk and then sniffs the air away from the car. At no point does “Tank” follow whatever he is smelling back to an originating point in or on the vehicle. In fact, “Tank” sniffs in the direction of the fence, away from the vehicle, with his head held high. Officer Moore brings him back to the driver’s side of the car and directs “Tank” to sniff the car by tapping his hand against it.

“Tank” steps back towards the front of the car, then walks around the back of the car (his third time at the back of the car at this point) and again steps towards the fence and the sidewalk. Officer Moore brings “Tank” back to the trunk and asks him to detail using his hand for a *fourth* sniff. “Tank” can be heard to whine and at Officer Moore’s hand signal, and jumps up briefly on his hind legs. Officer Moore continues to do a directed detail, tapping the vehicle on the passenger side for a *third time*. “Tank’s” focus is low on the vehicle. They again pass along the front of the vehicle and for the *fifth time* along the driver’s side, “Tank” can be seen sniffing the pavement. He walks out into the traffic lane and Officer Moore brings “Tank” back for a *sixth sniff* of the driver’s side. “Tank” and Officer Moore stop and “Tank’s” hind end and tail can be seen in an upright position, not in a sit and not in a down. “Tank” moves off, sniffs around the

rear of the vehicle for a moment, looks to his handler and moves off and away from the vehicle, again. Officer Moore brings “Tank” back to the vehicle again.

When Officer Moore brings “Tank” back to the front of the vehicle he directs him to sniff the driver’s side *again*. “Tank” comes into view with his nose on the ground as seen before, sniffing the pavement. He is brought back to sniff the driver’s side *yet again*, and Officer Moore points at the vehicle to direct “Tank” to sniff it. “Tank” has sniffed around and around the vehicle many times at this point, clearly understands that he is doing a vehicle sniff, and has attempted to walk away from the vehicle numerous times. But, this is not what Officer Moore is expecting, because Officer Moore believed that narcotics were present, and so he continued to push “Tank” to do a trained indication. After all, if ‘alerts’ were sufficient for probable cause then by Officer’s Moore’s account, the sniff would have been completed as soon as “Tank” ‘alerted’ to the driver side door – which did not happen as shown in the video.

At this point in the video Officer Moore begins to position himself in close proximity to “Tank”, his leash handling becomes cumbersome to the dog and he continues to direct “Tank” to sniff along and around the vehicle. The two become tangled in the long line and the dog has to be untangled.

In total, “Tank” was directed to sniff the trunk eight times, the passenger side seven times, the front of the vehicle four times, and the driver’s side seven times. They spend nearly three minutes (2:56) on this sniff. Several times “Tank’s” sniffing is directed away from the vehicle, towards the fence, out in traffic, back towards their own vehicles, and on the ground. At no point can “Tank” be seen to do a trained behavior as described by Officer Moore – a sit or a down – and at no point is there any apparent attempt by the dog to do either of those behaviors.

ii. Officer Moore was biased by Detective Allen, and believed “Tank” should indicate

Officer Moore’s report states that “When I arrived, I spoke with Allen. He informed me he had suspicion to believe there may be illegal narcotics inside the vehicle.” Incidentally, no such exchange can be heard in the video, nor can the initial request by Detective Allen for a K9 be heard.

Such information, specifically beliefs about the expected outcome of a sniff, can impart bias to the handler, and the handler is then susceptible to cueing the dog to alert incorrectly, or will state the dog alerts when the dog does not. In this case Officer Moore had an expectation that “Tank” should indicate because he had an expectation, as did Detective Allen, that narcotics were present. As explained by Lit et al. (2011), handlers' beliefs that scent is present *potentiates handler identification* of detection dog alerts. It is not always the case that a handler will mis-identify alerts or cue a dog to alert from bias. Decoupling the interdependence of a canine and its handler is done in training using methods that teach the dog to use conditioned cues (narcotics odor), and not unconditioned cues (e.g., odors other than narcotics that are commonly present and associated in training, containers, anomalies, handler behavior, overt cues). This will be discussed further, but for the purposes of the canine “Tank’s” reliability for the sniff based on the video record, Officer Moore reported that the K9 “Tank” alerted to the presence of narcotics

odor in the absence of behavior that should have been present (indication - sit or down), and which cannot be seen to occur.

B. Reliability

i. The K9 “Tank” had veterinary issues that affected his ability to perform

Veterinary care is often overlooked when it comes to assessing reliability, but the health and welfare of the canine is foundational for its performance (Evans and Lewis, 2018; Cobb et al., 2015). Veterinary records show that “Tank” suffered from degenerative hip disease and chronic degenerative joint disease in his elbow. This was determined on his initial intake exam, two weeks after being imported from Slovakia. “Tank” arrived in less than good health, with oral issues and suspected dental disease, diarrhea and parasites requiring treatment. The veterinary record shows radiologist consultation and discussion with Officer Moore about concerns for chronic joint disease for a working dog. No follow up on the K9 “Tank’s” elbows or hips was done to determine how the disease was progressing.

The effect of the joint disease did appear in the training record, although it is attributed to a training issue and was not recognized as an underlying veterinary issue. The pain associated with joint disease, or dysplasia, manifests in the physical performance, or lack thereof¹ that can be seen in training. Dogs with joint pain may not have full range of movement, and resist doing activities or movements that are painful. It was noted in training records that “Tank” was not performing in training when hides were set high (from training logs dated 6/21/18: “We continue to train on hides which are up high, forcing him to be comfortable getting up on his hind legs) [emphasis added]. This is one of many references to the fact that “Tank” was exhibiting a physical limitation affecting his training and performance. Given the established medical issue with hips and elbows it would have been appropriate to conduct additional consultation to assess his physical ability to perform as a working dog in the context of his not showing full range of motion.

Joint disease, or dysplasia, or arthritis or acute injury or any of a myriad of illnesses, conditions or diseases that prevent or inhibit a canine from having full functionality to move, sniff, breathe, or otherwise perform normally, impacts the reliability of the dog. Working dogs are expected to be in good health and free of medical conditions that affect their performance². “Tank” suffered from a condition that affects a dog’s performance and as such, cannot be considered reliable.

ii. Training records show lack of rigor and do not show the team is reliable

Reliability is reported as a percent or proportion and is calculated on training that is conducted under controlled conditions, where the answer or solution to the set is known, but not by the handler. Controlled conditions occur in training, and specifically when the handler has no knowledge of the solution to the set (number of hides to include NO hides as a possibility or location), nor is someone in a position to offer clues to the handler which biases the outcome. This is accomplished through blind or double-blind training. It is important that the possibility of zero hides exists and that determining whether or not an area is blank is done using a simple

¹ <https://vcahospitals.com/know-your-pet/degenerative-joint-disease-in-dogs>, accessed 2/8/2020

² See current best practices for working K9 selection https://swgdog.fiu.edu/approved-guidelines/sc3_selection_of_serviceable_dogs.pdf, accessed 2/8/2020

randomization method (e.g., coin toss, draw numbers from a hat). These principles were not integral to the training of “Tank”.

The records show that “Tank” was first certified for narcotics on July 17, 2018 and that Officer Moore did not do any narcotics training until mid-August, noting that “Tank” “...still has a lot to learn but has not regressed one bit.” Their next training for narcotics was two months later, in October (3 hours reported), and then again in November (2 hours reported). Training records changed to Packtrack beginning November 20, 2018 and were provided through March 1, 2019. Given that the sniff in question was reported for February 28, 2019, the training records for March 1st do not apply to a sniff on February 28th.

The Packtrack training summary is not accurate when cross-referenced with the Packtrack “training odor list”, therefore it is not useful for the purposes of this assessment. That aside, training records for “Tank” lack detail needed to calculate reliability, therefore I cannot calculate reliability for him. This does not mean that I find him to be reliable. According to the Packtrack records, Officer Moore and “Tank” conducted only one blind training, but the outcome of that training is not provided. In fact, no record of how many, or which hides “Tank” found is reported. No commentary is provided to indicate whether or not there were any training issues, if “Tank” was performing an independent trained final response (sit or down) – and this is a critical failure, because Officer Moore states that “Tank” does either of those behaviors; yet there is no record of any of the behaviors (or ‘levels of alerts’) that were cited in the supplemental report for the sniff in question.

The use of K9 “Tank” for narcotics sniffs prior to the sniff in question, the number of indications he gave, how many times narcotics were recovered given an indication, how many times narcotics were not recovered were not provided. While deployment records are not part of the reliability calculation, they do provide a calculation for the likelihood that a canine indicates and insight into the likelihood that indications are productive for contraband.

iii. Deployment records state “Tank” performed indications on duty and do not show ‘alerts’ triggered searches

The PackTrack summary of deployments reports that “Tank” performed 25 indications between October 20, 2018 and March 1, 2019. Twenty-one are listed as specific to narcotics or paraphernalia. The PackTrack deployment log for the same time period shows that three times when “Tank” indicated, no narcotics were located.

- a. Alert v Indication – a trained behavior is what delineates target odor from any other odor, not natural behavior of sniffing something interesting to a dog

The terms ‘alert’ and ‘indication’ can be confusing, as the two terms are often used interchangeably, even in the scientific literature (e.g., Wilson et al., 2019; Poupko et al, 2018; Topoleski et al, 2018). For the purposes of this report, I use the terms as defined by UT POST, since that is the governing body for this team’s training. The POST manual defines K-9 Indication (chapter 7, page1) as:

1. Alerting the handler to the presence of the odor of contraband. An alert is the “natural behavior” the dog exhibits when it first perceives a target odor,

behavior which the handler recognizes due to the frequent observation, but which may not be easily perceived by an unskilled person.

2. Indicating the source of the odor to the handler. An indication is behavior which is easily perceived by the handler or an unskilled person. This behavior may be a “trained” behavior, or it may be a “final response” the dog exhibited on its own.

Note that in the UT POST definition the terms ‘alert’ and ‘indication’ are inextricably linked. Therefore, by the UT POST definition an indication is the behavior of sniffing something of interest to the dog AND the trained behavior, in this case either a sit or a down per Officer Moore. An indication is trained as the definitive signal to a handler that the K9 indeed detects narcotics odor and not something else of interest to the dog, because there is overlap in behaviors exhibited by dog when it smells something of interest to it (e.g., another dog, urine, a cat, food, etc.) and target odor. The overlapping behaviors include but are not limited to closed mouth (to channel odor through the nose), sniffing, change in body carriage, seeking point of origin or highest concentration of odor. These behaviors can be observed in pet dogs and wild canines, not just working canines, because they are innate behaviors; also stated in the POST manual (chapter 7, page 7) “The Alert behavior cannot be trained into a K-9 ... it is natural behavior.”

These alert behaviors, which the dog does naturally and innately, are indicative that the canine smells something it wants to get to, and it actively seeks to get to the origin of that odor. It is for this reason that a final indication (e.g., sit or down) is trained, to eliminate the need to guess what it is the canine is responding to. Both alert behavior and the trained indication together are clear signals on what the dog detects. A sit or down without the alert behavior is not definitive for target odor, and alert behavior without a sit or down could be anything. Chapter 7, page 6 of the POST manual provides a series of photographs of a canine working a vehicle past a distraction, showing the “Narco Dog has Pinpointed the source of a narcotic odor and Indicates by sitting, notice the stare at source.” This is another example highlighting the expectation from UT POST that the trained sit (or down) is expected to be definitive for narcotics odor.

The term ‘Indication’ is also defined, again, in chapter 7 on page 8 this way: “Indicating is the trained behavior exhibited by a Narco Dog after it has “Alerted” to a drug odor and “Pinpointed” its strongest source.” This section goes on to state,

“Finally, two more points are important to understand. First, Indicating is a trained behavior to tell the Handler (and others, such as an Attorney, a Judge, or a Jury) that the strongest source of odor is at a certain spot. Second, Indicating does not always occur and is dependent on the environment. Indicating is optimal but not critical to the interdiction of drugs in a criminal investigation when profound Alerting behavior is being displayed.”

The qualifier ‘profound’ is not described, nor is it correct that *indicating is not critical*... After all, if it were true that alert behavior alone was sufficient then an indication would not be *required for certification*, as it is in Utah, nor would such emphasis be placed on explaining the

difference between alert behavior and indication. The POST manual does not offer information on what environmental factors affect whether or not a canine indicates.

C. Certification

Certification is described in POST manual in chapter 7 pages 11-18. Of interest, the POST manual states that certification is not mandated. There are many significant ways in which the UT POST certification fails as an assessment. In summary, the emphasis on subjective measures of performance, the lack of single or double blind protocols, the lack of randomization for number of hides, the lack of important and expected parameters (i.e., narcotic types, weights, disallowed odors such as pseudo-scents), undermines the validity of the UT POST certification as anything more than a training exercise.

i. Scenarios

The test lists seven scenarios, and it is not clear how many are required to be completed for certification, although it is stated that each scenario must be passed “on its own Merits”. The barn and the buried scenarios can be replaced with something else at the agency’s request. Examples of what might qualify as being “of comparable difficulty” are not provided.

a. The handler knows the number of hides in each scenario

The scenarios have a known, stated number of hides which invalidates the tests as blind. The handler knows what the outcome should be, because there is no randomization of the number of hides. For example, there are two hides in the business establishment scenario and there are three hides in the residential scenario. There is little opportunity to show the degree to which a dog has a false alert problem, because once the number of hides matching what is prescribed are located, the handler will stop the exercise. If the handler does not know how many hides are present, he or she must conduct the search or sniff until he or she is satisfied that all have been located. A properly trained dog would not false alert when pressed to continue to search even if the handler may believe more hides could be present. In the UT POST scenarios, that significant factor is not tested.

Because the sniff in question with “Tank” was a vehicle sniff, it is important to point out some serious shortcomings in the automobile sniff scenario, in addition to those listed in this section. First, there are only two vehicles in the scenario – one vehicle has two hides and also uncirculated currency. As described, this is nothing more than a known training problem, because once the dog shows which vehicle had narcotics, then the handler can employ a number of strategies to ensure the dog does not indicate on the blank vehicle. Regarding the uncirculated currency, which is considered a diversion and should not contain narcotics odor, this too is an exercise which can be controlled by the handler and mask a false alert issue on the part of the dog.

ii. *Complicated scoring system relies on subjective, not objective, measures*

After the description of the scenarios, there are pages of complicated, subjective assessment score sheets. Rather than a simple pass or fail based on whether or not the canine correctly solved the problem (i.e., found the narcotics and did not false alert), the evaluator subjectively rates searching skill, indications (note, indications are required of the canine as part of the certification), and handler skill. The “Explanation Evaluation Criteria” are the same as “Grading Scale or Increments” and are the same as “Grading Curve”. What those mean are entirely subjective and will vary with evaluator, and evaluator experience; for example the difference between ‘comparable to veteran narco dog’ (letter grade C) and ‘consistent with deployment needs’ (letter grade D) is not defined or explained.

The POST manual on page 17 (Ch. 7) states, “Internationally, Police Dog performance is evaluated via the scale listed on the previous Gradesheet. In order to assist Officers and Administrators in the United States of America to understand the overall ‘grade’ achieved by the K-9, the following Comparative Chart has been created. It compares several different grading scales utilized in the USA.” There are no references pointing to a universal *international* performance ranking system, nor is there a universal ranking system in the *United States of America*. This information is presented as if there exists unified acceptance of this subjective and complicated manner for grading certifications. The certification verbiage further refers to “gpa” (grade point average), which is not standard nor typical for narcotics certifications in the United States. After all, the dogs and handlers are not taking written tests as if in school. For comparison, neighboring Nevada POST narcotics certification is pass/fail³ and includes randomization of the number of hides. The Pacific Northwest Police Detection Dog Association which certifies narcotics K9 teams in neighboring states conducts double-blind testing, and is conducted pass/fail⁴, as does the North American Police Work Dog Association⁵.

While the certification test states that no false indications are allowed, there is no guidance on how that is determined. What if the canine sits and then changes position and sits again in a different location? What constitutes a find (how close does the canine have to be to be considered ‘correct’)? Is this an evaluator call, where the evaluator must see the sit or down or is this a handler call? How does anyone see what the dog is doing in the dark room scenario? Does the handler state what the indication is prior to beginning the test and what happens if the dog does something different than expected? For example, Officer Moore states that “Tank” does either a sit or a down. How many different behaviors are allowed? None of these factors are explained, but can have a significant impact on the outcome of the test.

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http://post.nv.gov/uploadedFiles/postnv.gov/content/Training/Canine/Dogs_Master%20Document%20August%202014.pdf (accessed 2/8/2020)

⁴ <https://www.pnwk9.org/standards/> (accessed 2/8/2020)

⁵ <http://www.napwda.com/uploads/bylaws-cert-rules-june-8-2019.pdf> (accessed 2/8/2020).

iii. *Lack of standardization and no agency policy for narcotics testing – no documentation on the odors “Tank” was tested on for certification*

With one exception, there are no narcotics quantity limits specified to certify to UT POST. Instead, the odors and quantities are “determined by jurisdictional need” and “comparable to quantities experienced in deployment”, respectively (chapter 7, page 2). The West Valley City Police Department is Officer Moore and “Tank’s” agency, and the canine policy states in section 318.7 under “training” that the canine teams will train and certify to UT POST standards, or another certification standard (unspecified), but there are no specifics on which odors and in what quantities their canines should be tested to. The certificates provided for “Tank” do not list what odors were used in his testing, nor quantities. In this case, with “Tank”, because score sheets were not provided, nobody can say what odors “Tank” was tested to. Because odors and weights are not specified in the certification parameters (with one exception for the buried narcotic which can be any narcotic so long as it is 1000 g), there is ample opportunity for inconsistent tests and biased tests. This goes against best practices, which state a minimum of 5 grams of narcotic substance be used in certification tests⁶.

There are no parameters defining limits on where hides may or may not be placed. One canine might be tested with hides hidden high, in a ceiling for example, while another might have all hides within easy reach. There is no description about what constitutes valid scent sources. Is pseudo-scent allowed? Is the dog tested on its handler’s own narcotics (injects bias) or on narcotics provided by the evaluator or someone else? There is insufficient guidance provided to ensure objectivity and minimize bias in the testing process. These specifications are expected to be outlined.

iv. *Qualifications of judges are not explicit*

According to the POST manual, it appears that judges are the ones who evaluate certification tests. Judges are trained by other judges, “who may then evaluate and declare the Judge’s competency.” There does not appear to be a training curriculum for judges, but there are a number of performance objectives items listed “according to the International guidelines for Narcotics Detector Dog or PSP-2 guidelines”. No supporting reference for either was provided. Conflicts of interest between judge and handler or canine are not a consideration for evaluation, which goes against best practices.

v. *“Tank’s” certificates of certification to UT POST*

None of the score sheets that would have been completed and kept on file were provided, only the certificates. Therefore, it cannot be determined what odors, in what quantities, in what configurations, or even what scenarios were used for certification. All that can be said is that K9 “Tank” with Officer Moore received the following certificates from the State of Utah POST:

- Narcotics Detector Dog (“reality-based”)
 - a. July 17, 2018
 - b. February 16, 2019

⁶ https://swgdog.fiu.edu/approved-guidelines/sc8_narcotics.pdf (accessed 2/8/2020)

- Narcotics Detector Dog Handler (“reality-based”)
 - a. August 22, 2017
- Patrol Dog Handler (“reality-based”)
 - a. May 18, 2017

D. Utah POST Narcotics Dog Program

This manual, in its many revision versions, is confusing, misleading, self-contradictory and much of the information is incorrect and certainly outdated. Although the POST manual presents a great deal of text pertaining to what is termed ‘psychology’, there is no merit or justification for the myriad of attributes and perceived behaviors presented. Much of the material presented makes no sense. For example, chapter 8 (rev. 2014), the “History and Evolution of Police Service Dogs in Utah” ends in the 1990’s, and has very little if anything pertaining the use of canines in Utah. According to this chapter in the POST manual there have been no advancements, developments or accomplishments to canines in Utah since the 1990s, over the past 20+ years to present. This is not true. This is the version that would have applied to Officer Moore and the training of “Tank”. In the revised 2019 version, chapter 8 was modified greatly, and is replete with erroneous concepts and incorrect definitions. For example it states that comparative psychologists are mainly in the United States, while zoologists who study ethology are mainly in Europe. This is absurd. Comparative psychology is the study of behavior or non-human animals as related to adaptation and evolution, and as compared with humans. Ethology is the study of animal behavior in an animal’s natural environment and viewed through the lens of evolution and adaption. Charles Darwin is a well-recognized scientist whose work was foundational to the fields of comparative psychology and ethology. These early fields of study were under development in the late 19th century and early 20th century, and our understanding of canine behavior and specifically their ability to conduct higher order complex processing has advanced significantly over the past century (Lea and Osthaus, 2018). It is incredible that the POST training manual returned zero instances of the word ‘cognition’ given the number of pages dedicated to how canines learn and the science of canine detection. This is an unfortunate disservice to canine handlers.

A complete review of the POST manual would be lengthy, and in the interest of the purpose of this report and the facts that informed my opinions, I will provide selected examples of how the training program sanctioned by UT POST instills bias and cannot be deemed sufficiently rigorous to produce reliable canine teams. The certification component is one of those examples, which was discussed above and will not be discussed further here.

- i. The approach to training dogs is stated to be based in science, but the science presented is neither applicable nor relevant*

The underlying scientific context for canine training that the POST manual presents is simply incorrect. Instead of presenting concepts of cognition, which acknowledges that dogs are able to process complex information and are not simple stimulus-response creatures like amoebas, the manner of approaching dog training by POST is presented under the principles of ‘dog psychology’, and specifically zoology (the scientific study of the behavior, structure, physiology, classification, and distribution of animals), ethology (study of naturalistic animal behavior and its

relationship to its evolutionary origins), and cynology⁷ (the study of matters related to canines or domestic dogs). These are not scientific fields of study where canine detection research is focused or published in the scientific arena nor do these fields pertain to our understanding of how dogs learn.

Modern understanding of canine training has long been rooted in classical and operant conditioning, not ethology – a field developed by Konrad Lorenz, well known for showing how geese bond instantly with the first thing they see after hatching that moves. Ethology studies animals in their natural environment and focuses on instinctive behavior. Conditioning uses reinforcers (e.g., food or toys or praise) to teach animals to do things like indicate at the highest concentration of narcotics odor.

Canines are cognitive animals (Cliff et al., 2019; Albuquerque et al, 2016; Bensky et al, 2013). An entire special issue of the journal *Learning & Behavior* was dedicated to the cognitive (and sensory) abilities of dogs (Katz and Huber, 2018). There is no mention of cognition in the POST manual. The extensive list of alleged ‘drives’ and ‘dog psychology’, and their descriptions have no basis (Costall, 1998) and lack scientific support.

- ii. *The training approach presented builds interdependence between handler and dog, not an independent canine*

Given the misunderstanding of the foundations of canine detection training, it is not unexpected to find that bias between handler and canine are built into the UT POST program. One example of this is found in Chapter 7, page 7, where ‘alerting’ is defined for a second time. With that definition is a ten-point list of things that, according to the POST manual, the handler or a “highly skilled K-9 expert” could perceive as alert behavior. The first six of these are physiological and are related to sniffing, and two are a combination of physiological responses and training. The last two show how bias is built into the training program. When a handler sees his or her dog doing behaviors 1-8, he or she gives the verbal search command “which may cue the indication”, or if the dog is not actually alerting but is only “showing interest on a non-drug odor” then the dog continues its search. There are a number of different concepts that are being confounded in this section of the POST manual. What this section teaches is that alert behavior does not necessarily mean target odor specifically, and a handler should intervene to cue the dog to perform an indication. Thus, the dog learns that when it sniffs intently at something, whether it is or it is not target odor, the handler will step in and give a verbal cue. When the handler gives the dog this verbal cue, it should sit or down. In this manner, the indication may or may not be related to target odor and is not determined based on target odor. This is one way that dogs are taught to false alert. This section is explicit that there is overlap in the behaviors between non-target odor and target odor, and that a handler or highly skilled K9 expert would not be able to determine whether or not the behavior from the dog pertained to target odor by the dog’s behavior alone.

⁷ A web of science search on 2/8/2020 using the keyword ‘cynology’ for the years 1970-2020 yielded exactly two results. One was a study from 1990 on mineral metabolism in dogs, and the other was published in 2017 about asymmetrical hip joint development.

- iii. *The presentation of ‘scientific articles’ denies that canines are imperfect and can make mistakes*

Chapter 21 is titled ‘Narcotics detector dog logistical and scientific research’. The purpose of this chapter is not specified, as there is no preface. In this chapter sections of text from unreferenced “experiments” are presented, labeled “Experiment #”. The first excerpt, labeled *Experiment #1*, is a subset of text from a paper published in 1994, the second excerpt, labeled *Experiment #2* is a subset of text from a conference proceedings from 1997. *Experiment #3* is a mystery, and a Web of Science search and a Google search yielded no results for the title. It appears that the conference proceeding from 1997 was separated into two sections and a title was added by Wendell Nope, the POST manual’s author. *Experiment #4* was also a conference proceeding, from 1996. This section could have been updated (current version revised 26 July 2016) to include more recent and significantly, peer-reviewed publications in their entirety.

The relevance of the fact that these are conference proceedings, is that scientific publications are not all equal and are not given the same amount of weight in terms of rigor and significance. One strength of a scientific research paper lies in being peer-reviewed, a rigorous process of having other qualified researchers critique and challenge the methods, results and interpretations of a paper submitted for publication. Conference proceedings, such as those included in the ‘scientific research’ section of the POST manual, are NOT peer reviewed and do not carry the weight, or significance of a peer reviewed paper. This is particularly relevant when it comes to the next section (“experiment #5”).

Experiment #5 is a peer-reviewed research paper, titled ‘Handler beliefs affect scent detection dog outcomes’ published in the scientific, peer-review journal *Animal Cognition* in 2011. This rigorous study showed that when handlers have a bias to the presence of target odor, that bias can affect dog alerts (indications) and can bias how handlers interpret dog alert behavior in the absence of indications. This study was met with a range of responses from canine handlers, from agreement to emotional rejection of the study altogether (Lisa Lit, pers. comm.). In response to the study, vocal canine advocates such as Terry Fleck published their own op-ed pieces online in personal blogs and websites. Mr. Fleck’s opinion is provided in the chapter on ‘science’, although he was not a scientist (he is now deceased) and had no scientific training, and despite the fact that his post was a self-published opinion lacking peer-review. Similarly, Wendell Nope, the author of the POST manual presents his own opinions attempting to counter the results of the peer-reviewed Lit et al. (2011) study, also acknowledging that he has no scientific background or formal training. His assertions that there was a flaw with the study likewise lack merit.

There is an established, formal process for challenging a peer-reviewed study, and neither Mr. Fleck’s nor Mr. Nope’s opinions about the study followed the professional route. Peer-reviewed articles can be challenged by submitting concerns about a specific article in writing to the editor of the scientific journal. Those challenges are likewise subject to peer-review, just as the original research paper is subjected to peer-review. Challenges to published scientific studies are expected to have scientific merit. This is particularly relevant with respect to the next article in the section, which is an excerpt of a letter published by the federally funded committee Scientific Working Group – Dogs and Orthogonal Detectors (SWGDOGS)⁸, that established best practices

⁸ <https://swgdog.fiu.edu/> (accessed 2/13/2020)

for canine disciplines in the late 00's. Whether the head of the SWGDOG committee submitted this opinion piece and it did not pass peer-review, or it was never submitted, this is simply another opinion lacking scientific merit. Therefore, none of the opinions that are included in the POST training manual presented to counter a single peer-reviewed study that shows bias can exist in detection dog teams, have merit. This entire section does a great disservice towards teaching potential canine handlers about best practices and how effective dogs can be when properly trained.

What is also concerning from an education perspective, namely what handlers in Utah are being taught, is the next piece that is presented in the POST manual in chapter 21, page 36. This article is formatted to appear as if it was a peer-reviewed publication, in fact almost identical to the Lit et al (2011) paper. The title is 'Handler beliefs do not affect police detection dog outcomes' and the purpose of the paper is to counter the results found in the Lit et al (2011) study. This paper is NOT a peer-reviewed publication, it was not published in a scientific journal, it did not replicate the Lit et al (2011) study, and it was conducted by a for-profit dog training group. There is no scientific validity to this study, or any of the opinion pieces included in the chapter devoted to scientific (and 'logistical') research. Yet, the POST manual presents this alleged study with the guise of having validity as a scientific study. Without the original publication formats of the conference proceedings and lacking appropriate references to the works themselves, this entire chapter does a great disservice to handlers.

A section in any detection dog training manual devoted to presenting canine detection science is a big undertaking because of the sheer volume of studies that pertain to the many underlying disciplines such as chemistry, olfaction, physiology, behavior, cognition, human psychology, learning, environmental science, and others. The POST manual chapter on 'logistical and scientific research' does a great disservice to and undermines canine handlers' understanding of canine detection because it does not actually focus on science, rather it takes a deliberate defensive posture against an imaginary foe.

iv. *The material presented in the POST manual is incorrect and misleading*

Chapter 16 of the POST manual pertains to court testimony. On page 8, Mr. Nope refers to "Dr. Terry Fleck". Mr. Fleck was a Deputy Sheriff II for the El Dorado Sheriff's Office in California. This rank is below sergeant and as a Deputy Sheriff II Mr. Fleck was not responsible for supervising or training deputies. Mr. Fleck did not refer to himself as "Dr. Fleck", nor is there any reference to formal education anywhere on his legacy professional website (www.sheepdogguardian.com)⁹ or LinkedIn page (<https://www.linkedin.com/in/terry-fleck-6a111573/>)¹⁰. In court testimony he was referred to as "Mr. Fleck" and not "Dr. Fleck" (*United States v. Mercado-Gracia*, CR No. 16-1701 JCH (D.N.M. May. 21, 2018); *United States v. \$209,815 in U.S. Currency*, Case No. 14-cv-00780-MMC (N.D. Cal. Apr. 21, 2016)). In my many years of knowing Terry Fleck he never mentioned attending college or having a higher degree, nor is there mention of *where* he might have earned an advanced degree. He is listed as Ed.D. (Doctor of Education) as co-author of a book sold on Amazon.com¹¹. An Ed.D. is not a

⁹ last accessed 2/13/2020

¹⁰ last accessed 2/13/2020

¹¹ <https://www.amazon.com/Ethics-Legal-Issues-Courtroom-Handlers/dp/1544241569> (accessed 2/18/20)

scientific nor research degree, rather it is a teaching degree completed through coursework. In short, Mr. Fleck was a career K9 handler who was integral to the development of best practices and specifically the SWGDOG guidelines, to which UT POST does not adhere. Presenting Mr. Fleck as “Dr.” in an attempt to elevate the credibility of his op-ed piece against the Lit et al. (2011) study does a great disservice to handlers’ education.

In summary, the material presented in the POST manual lacks validity, accuracy, misrepresents and misleads what is known about canines and their ability to learn and perform detection tasks, is self-contradictory, and instills bias between canine and handler. It is outdated and lacks currency with best practices.

Documents in Support of Opinion and Testimony

I reviewed the following documents, which are foundational for my opinions, and are referenced in this report.

1. Police Reports pertaining to this case;
2. Utah POST K-9 Program Narcotics Detector Dog Training Manual (many revised versions intermixed from 6 January 2014 to 26 July 2016 and a portions dated 2019);
3. Body camera video of the sniff in question;
4. Certification documents for the K9 “Tank”;
5. Certification documents for Officer Moore;
6. Veterinary records for K9 “Tank”;
7. Packtrack deployment log (10/20/18 – 3/1/19);
8. Utah County certificate of completion for “disciplines and skills” (unspecified), undated;
9. Spillman training summary, appears to be canine training records (6/19/98-11/1/18);
10. Spillman training logs (6/19/98-11/1/18);
11. Packtrack training records (11/20/2018 – 3/1/2019);
12. Packtrack training summary (10/20/18-3/1/19);
13. West Valley Police Department Canine Policy updated 3/1/2018;
14. RandyHare.com website (last accessed 2/6/2020);
15. Other websites referenced in footnotes, and scientific literature cited, below.

References Cited

Albuquerque N, K. Guo, A. Wilkinson, C. Savalli, E. Otta, and D. Mills. 2016 Dogs recognize dog and human emotions. *Biology Letters*. 12: 20150883.
<http://dx.doi.org/10.1098/rsbl.2015.0883>

Bensky, MK, SD Gosling, DL Sinn. 2013. The world from a dog’s poin of view: a review and synthesis of dog cognition research. *Advances in the study of behavior*. 45:209-406.

Cliff, JH, SMK Jackson, JS McEwan, LA Bizo. 2019. Weber's Law and the Scalar Property of Timing: A Test of Canine Timing. *Animals*. 9(10): 801; doi:10.3390/ani9100801.

Cobb, M, N. Branson, P. McGreevy, A. Lill, and P. Bennett. 2015. The advent of canine performance science: Offering a sustainable future for working dogs. *Behavioural Processes*. 110:96-104.

Costall, A. 1998. Lloyd Morgan, and the rise and fall of “animal psychology”. *Society & Animals*. 6(1): 13-29.

Evans, KM and TW Lewis. 2018. Preventing skeletal and neurological problems in guide dogs for the blind and other working dogs. *Revue Scientifique et Technique-Office International Des Epizooties*. 37(1):151-160.

Katz, JS and L. Huber. 2018. Canine cognition. *Learning & Behavior*. 46:333-334.

Lea, SEG, and B. Osthaus. 2018. In what sense are dogs special? Canine cognition in comparative context. *Learning & Behavior*. 46:335-363.

Lit, L., JB Schweitzer, AM Oberbauer. 2011. Handler beliefs affect scent detection dog outcomes. *Animal Cognition*. 14(3):387-394.

Poupko, JM, WL Hearn, and F Rossano. 2018. Drug Contamination of US Paper Currency and Forensic Relevance of Canine Alert to Paper Currency: A critical review of the scientific literature. *Journal of Forensic Sciences*. 63(5):1340-1345.

Topoleski J, CA Schultz, and WG Warren. 2018. Identifying and Resolving End of Session Cues in Substance Detection Canine Training. *Frontiers in Veterinary Science*. 5:206

Wilson C, S. Morant, S. Kane, C. Pesterfield, C. Guest and NJ Rooney. 2019. An Owner-Independent Investigation of Diabetes Alert Dog Performance. *Frontiers in Veterinary Science*. 6:91.

Qualifications as an Expert Witness

I, Mary E. Cablk, Ph.D. have been qualified as an expert witness in Colorado, Illinois, Massachusetts, Nevada, New York, Utah, Virginia, and Wyoming on K9 science disciplines and topics pertaining to the science of K9 detection, training detection dogs, training handlers and I have been qualified as an expert on and testified to my own K9s. I train and deploy my own K9 as an auxiliary deputy and I train other handlers and their dogs.

I conduct research on K9 detection and have published the results of my work in peer-reviewed scientific journals and elsewhere. I am an associate member of the American Academy of Forensic Sciences, and I address the Academy on K9 issues frequently, typically every year. I serve on an advisory committee to the Academy's standards board to revise current federal best practices for K9 detection.

I have and continue to lecture on K9 capabilities, uses, deployment aspects, and target detection in the United States, Europe, Asia, and Africa. The target disciplines I have been involved with include narcotics, explosives, human remains, live human odor (area, tracking, trailing, articles), scat and wildlife. I have addressed, by invitation in the US and abroad, government officials, military, law enforcement, non-governmental organizations, defense attorneys, prosecutors, and judges on topics and issues relevant to K9s and the law.

I have taught formal classes and multi-day seminars to canine handlers from multiple K9 disciplines on training protocols, record-keeping, and best practices as well as hands-on training of dog-handler teams. I have developed and participated in the development of K9 standards for multiple state and federal agencies. I am a Nevada POST K9 evaluator and a California POST certified evaluator and instructor.

I am affiliated with Nevada law enforcement agencies as an auxiliary deputy and K9 handler and am a professional detection and search/rescue/recovery K9 trainer. I have trained, certified, and deployed three of my own K9s since 2000.



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Professional Preparation

Virginia Polytechnic Institute and State University	Biology	B.S.	1989
Duke University, School of Forestry & Environmental Studies	Resource Ecology	M.E.M.	1991
Oregon State University, College of Forestry	Forest Resources	Ph.D.	1997

Professional Appointments

2017 – present Owner, Detection Science Solutions LLC

2013 – present Adjunct faculty, Department of Anthropology, University of Nevada Reno

2013 – present Graduate faculty standing, University of Nevada Reno

2006 – present Associate Research Professor, Division of Earth and Ecosystem Sciences, Desert Research Institute (DRI), Nevada System of Higher Education (NSHE) Reno, Nevada

2000-2006 Assistant Research Professor, DEES, DRI, NSHE Reno, NV

1999-2000 Postdoctoral Associate, Division of Earth and Ecosystem Sciences, Desert Research Institute, Reno, Nevada

1997-1999 National Research Council Postdoctoral Associate, Western Ecology Division, US Environmental Protection Agency National Health and Environmental Effects Laboratory, Corvallis, Oregon

Research Programs: Detection technology; Canine detection capability; Visualization; Remote sensing; Spatial analysis and modeling.

Director, Desert-tortoise K9 (DTK9) Program 2003-2011.

Expert Witness: Colorado, Illinois, Massachusetts, Nevada, New York, Utah, Virginia, and Wyoming; science of K9 detection, K9 detection disciplines, training K9s, training handlers, applied science.

K9 affiliations:

- Humboldt County (NV) Search and Rescue K9 Squadron (2018-present)
- CA POST instructor (2018): Winter Search and Rescue (40 hr course)
- CA Governor's Office of Emergency Services (2015-present): Agent for FEMA/NIMS standards
- NV POST K9 evaluator and instructor (2014-present): HRD, water, avalanche, area/wilderness
- Washoe County Sheriff Office Search and Recovery K9 Unit (Lead) (2014-present)
- Northern Nevada Disaster Victim Recovery Team, Washoe Co. Office of the Coroner, (2013-present)
- Nevada POST K9 Standards Working Group (2013-present)
- Lyon County Sheriff Office Human Remains Detection, Land and Water K9 Team (2012-present)
- Douglas County Sheriff Office Search and Rescue (support, ~2003 – present)
- Elko County Sheriff Office Search and Rescue (support, ~2011-present)
- Lander County Sheriff Office Search and Rescue (2005-present)
- Handler/Board of Directors, Wilderness Finders, Inc. (WOOF) (2000 – present/2003-present)
- Kenyon International (2011-2013)

- K9 Team Leader and K9 coordinator, Lassen-Volcanic National Park (“Volcanines”) (2006 - present)
- K9 Handler, Yosemite Search and Rescue (YODOGS) (2005-2009)
- Backcountry Team Leader, WCSO Hasty Team (2000-2008)

Law Enforcement Affiliations:

- Auxiliary Deputy, Lyon County Sheriff Office, Nevada
- Auxiliary Deputy, Washoe County Sheriff Office, Nevada
- Search and Rescue Support (K9 handler), Douglas County, Nevada
- Search and Rescue (K9 handler), Humboldt County, Nevada

Professional Society Membership and Technical Training

- American Academy of Forensic Sciences (2018-present)
- Viewing Research Through Different Lenses: How to Achieve Success in Court, American Academy of Forensic Sciences Workshop. New Orleans, LA. (2017)
- Direction and Control of the Search Function (2016), State of California POST
- Nevada POST K9 Evaluator Course (2015), State of Nevada POST
- Serial Murder (2014) professional development course, FBI Behavioral Analysis Unit
- Fatal Fire Investigation (2014), International Association of Arson Investigators, NV POST credited (16 hours).
- Human Remains Detector Dogs (2012), William R. Maples Center for Forensic Medicine at U FL and ASPCA
- Voting member, National Association of Search and Rescue (2011-2012)
- Associate Member, North American Police Work Dog Association (2010-2011)
- American Academy of Forensic Science workshop: Taphonomy of bone destruction; Seattle, WA. (2010)
- Forensic investigation of human remains from armed conflicts and catastrophes. American Academy of Forensic Science workshop. Seattle, WA. (2010)
- American Society of Environmental History
- Society for Conservation GIS
- The Wildlife Society
- American Association of Geographers
- American Geophysical Union
- Ecological Society of America
- Federal, State of Nevada, US Army and University permits for *Gopherus agassizii*
- Small tortoise transmitter attachment/removal (2007); Subcarapacial tortoise bleeding (2006)
- Desert Tortoise Surveying, Monitoring, and Handling Techniques Workshop November 8-9th, 2003, Ridgecrest, CA
- National Avalanche School (2004), 40-hour classroom lecture plus 3-day field evaluation
- Secretary/Treasurer (elected) American Society of Photogrammetry Remote Sensing Columbia Region Chapter (1998)
- Xi Sigma Pi, Forestry Honor Society, OSU (1996)
- Phi Sigma, Biology Honor Society, VPI & SU (1988)

International K9 Consultation:

- 2011 Costa Rica – K9 recovery and jungle training with Costa Rica Red Cross and Jonni Joyce International
- 2009 Norway – (Bergen) invited by Geneva International Centre for Humanitarian Demining to present *Quantifying detection dog team capability in the field deployment setting*.

- 2004 Turkmenistan – (Ashgabat) invited by U.S. State Department to instruct Turkmenistan government on capabilities of K9 teams, specifically in the disaster setting.
- 2004 Tanzania – (Morogoro) invited by U.S. Army Research Office to attend workshop on landmine sniffer ‘animals’ and present her DOD funded K9 detection research program.

Service on Advisory/Research Review Committees:

- 2019 Peer review: JoVE
- 2018 Peer reviewer: to Journal of Archaeological Method and Theory; PLOS ONE
- 2017 Peer reviewer: Remote Sensing Journal.
- 2014 Peer reviewer: IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing; Sensors
- 2013 Peer reviewer: IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing; International Conference on Military Geosciences, US Department of Energy.
- 2011 Peer reviewer: J Arid Environments, Southeastern Geographer.
- 2010 Peer reviewer: Sensors, J Env Mgmt, IEEE Journal of Selected Topics in Earth Observations and Remote Sensing.
- 2009 Peer reviewer: Army Research Office, Wildlife Research, Landscape and Urban Planning, J Veterinary Behavior.
- 2008 Peer reviewer: Army Research Office; Land Degradation and Development.
- 2007 Peer reviewer: IALC, J Vegetation Science, US Fish and Wildlife Service Non-invasive species program 2007, Canadian J Remote Sensing, Herpetological Review, International J Remote Sensing
- 2006 Peer reviewer: US Army Research Office, Canadian J Remote Sensing, Photogrammetric Engineering and Remote Sensing
- 2005 Peer reviewer: Journal of Environmental Informatics, Brief the Science Advisory Council to the Desert Tortoise Recovery Assessment Team, Southern Nevada Public Lands Management Act, US Army Research Office
- Invited as ambassador to consult to Turkmenistan Government/Military on developing working dog programs, US State Department (2005, 2006)
- Board of Directors and Grants review committee, The Access Fund (National non-profit organization) (2002-2005)
- 2004 Peer reviewer: US Army Research Office, Department of Defense SERDP Program, International Journal of Remote Sensing, Clark County Multiple Species Habitat Conservation Plan, Southwestern Naturalist
- 2003 Peer reviewer: US Army Research Office, Journal Arid Environments, Ecology, International Arid Lands Consortium
- Program Committee - Applied Geologic Remote Sensing 14th International Conference (2000)
- 2000 Peer reviewer: U.S. Army Corps of Engineers Engineer Research and Development Center (ERDC), FY01 Environmental Quality Basic Research

Teaching

- Contract training/program development through Detection Science Solutions LLC
 - Customized courses
 - Best practices for K9 handlers
 - Integrated training and HRD
 - Direction and Control of the Winter Search Function. CA POST Certified Course. 2018-present
 - Blind and Double blind training
 - Sheriff Office K9 handler training programs

- Double blind training for cadaver dog handlers. California Emergency Management Agency SAREX conference. Silver Lake, Amador County, CA. September 11-13, 2015.
- The Oso Land Slide: A Case Study. September. California Emergency Management Agency SAREX conference. Silver Lake, Amador County, CA. September 11-13, 2015.
- Double blind training for Human Remains Detection Dog Teams. California Emergency Management Agency SAREX conference. Big Basin, CA. September 6-8, 2013.
- Invited guest lecture UC Davis to “Canine Behavior” class July 23, 2013.
- *Human Remains Detection K9 Summit*. Desert Research Institute, Reno, NV: 2009-10.
- SARCON (State of Nevada Department of Emergency Management SAR Conference):
2010: Co-organizer of K9 instruction track and instructor for K9 cadaver track.
2007: Search and Rescue Dogs 101
2004: Lessons from the National Avalanche School
2003: An avalanche recovery at Mt. Rose Ski Area
- *Scent Theory*. December 2007. Regional Training Center, Reno, NV. Special seminar to Sacramento Task Force (FEMA) and WCSO SAR dog teams.
- *Wilderness Survival*. Spring 2006. Truckee Meadows Community College. 3-credit lecture.
- Research Education for Undergraduates (REU) advisor, UCWMRS (2002, 2003)
- Developed Spatial Analysis Supercourse for undergraduates through University of California White Mountain Research Station
- Workshop on Digital Change Detection Methodologies for Natural Resource Management and Research, U. of New South Wales, Australia (1999)
- Designed Introductory Remote Sensing Course and Workbook for Central Oregon Community College, Bend, OR (1998)

Student/Postdoctoral Advising

Amanda Williams. 2014 –2016. PhD student in anthropology at UNR. Creating a classification system for quantifying burned human remains.

Jotham Ziffer-Berger. 2008-2009. Postdoctoral Research funded by the International Arid Lands Consortium. Research Project: Pine expansion in arid land: fire effects on sage site abundance.

Anitra Sapula. 2008-2009. Masters Research Thesis support: Distinguishing weathered tool marks on bone: the taphonomic effects of surface exposure in semi-arid conditions within the American Great Basin Desert of Northwestern Nevada (Sagebrush Steppe and Pinyon-Juniper Woodland). University of Bradford, UK.

Erin Szelagowski. 2011. UNR Undergraduate Honors student in biochemistry, mentoring resulted in peer-review publication in leading forensic science journal.

Peer-Review Publications

Cablk, M.E., S. Clark, C. Valentin et al. *in prep*. A certification standard for wildlife detection dogs: Assessing safety and capability using Mojave desert tortoise detection dogs as an example. For submission to *Journal of Wildlife Management*.

Norton, R., **M.E. Cablk**, B. Ramsey, K. Smith, S. Bacon, S. Ostrowski, J. Wright, and S. Rodning. 2018. Defending against agroterrorism: Modeling Pathogen Dispersion Pathways. *Homeland Defense & Security Information Analysis (HDIAC) Journal*, 5(1):23-27.

Ziffer-Berger, J; P.J. Weisberg; **M.E. Cablk**; Y. Moshe; Y. Osem. 2017. Shrubs facilitate pine colonization by controlling seed predation in dry Mediterranean dwarf shrublands. *Journal of Arid Environments*, 147:34-29.

- Ziffer-Berger, J., P.J. Weisberg, **M.E. Cablk** and Y. Osem. 2014. Spatial patterns provide support for the stress-gradient hypothesis over a range-wide aridity gradient. *Journal of Arid Environments*, 102:27-33.
- Cablk, M.E., E.E. Szelagowski, and J.C. Sagebiel. 2012. Characterization of the volatile organic compounds present in the headspace of decomposing animal remains, and compared with human remains. *Forensic Science International*. 220:118-125.
- Cablk, M.E. and J.S. Sagebiel. 2011. Field capability of dogs to locate human teeth. *Journal of Forensic Sciences*. 56(4):1018-1024.
- Heaton, J.S., **M.E. Cablk**, K.E. Nussear, T.C. Esque, P.A. Medica, J.C. Sagebiel, and S.S. Francis. 2008. Comparison of human versus wildlife detector dog investigator effects. *Southwestern Naturalist* 53(4):472-479.
- Cablk, M.E., Sagebiel, J.C., Heaton, J.S., and C. Valentin. 2008. Olfaction-based detection distance: A quantitative analysis of how far away dogs detect tortoise odor and follow it to source. *Sensors*. 8(4):2208-2222.
- Nussear, K.E., T.C. Esque, J.S. Heaton, **M.E. Cablk**, K.K. Drake, C. Valentin, J.L. Yee, and P.A. Medica. 2008. Are wildlife detector dogs or people better at finding tortoises? *Herpetological Conservation and Biology*. 3(1):103-115.
- Raumann, C. and **M.E. Cablk**. 2008. Land-use/cover change in the Lake Tahoe Basin, California and Nevada, USA, 1940-2002. *Forest Ecology and Management*. 255:3424-3439.
- Cablk, M.E. and J.S. Heaton. 2006. Accuracy and reliability of dogs in surveying for desert tortoise *Gopherus agassizii*. *Ecological Applications*. 16(5):1926-1935.
- Minor, T. and **M.E. Cablk**. 2004. Estimation of Impervious Cover in the Lake Tahoe Basin Using Remote Sensing and Geographic Information Systems Data Integration. *Journal of Nevada Water Resources Association*. 1(1):58-75.
- Cablk, M.E. and T. Minor, 2003. Detecting and discriminating impervious cover with high-resolution IKONOS data using principal component analysis and morphological operators. *International Journal of Remote Sensing*. 24(23): 4627-4645.
- Hunter, L.M., M. de J. Gonzalez, M. Stevenson, K.S. Karish, R. Toth, T.C Edwards, R.J. Lilieholm, and **M. Cablk**, 2003. Population and land use change in the California Mojave: Natural habitat implications of alternative futures. *Population Research and Policy Review*. 22:373-397.
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- Miller, J., **M.E. Cablk**, V. Etyemezian, R. Shillito, and D. Shafer. 2013. Monitoring Soil Erosion on a Burned Site in the Mojave-Great Basin Transition Zone: Final Report for the Jacob Fire Site. Final Report to the Nevada Site Office, National Nuclear Security Administration, US Department of Energy. DOE/NV/0000939-13. DRI Report #45253.

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- Miller, J.J., R.H. French, S.A. Mizell, **M.E. Cablk**, and C.B. Kratt. 2011. Using Doppler Radar Precipitation Measurements to Enhance Estimates of Playa Inundation. American Society of Civil Engineers - Environmental and Water Resources Institute, World Environmental and Water Resources Congress 2011, May 22-26, 2011, Palm Springs, California.
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- Cablk, M.E., J.J. Miller, and S.A. Mizell. 2016. Comparing playa inundation estimates from Landsat and

LiDAR data to a Doppler radar-based hydrologic model. In E. McDonald, and T. Bullard, eds., *Military Geosciences and Desert Warfare: Advances in Military Geosciences*. Springer Publishing. pp. 153-167.

Cablk, M.E., 2015, Experiencing nature in militarized landscapes: If a bomb drops in the desert do we still call it wilderness? in Harmon, R.S., Baker, S., and McDonald, E.V., eds., *Military Geosciences in the Twenty-First Century: Geological Society of America Reviews in Engineering Geology*, v. XXII, 22:205-215.

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Other publications

Cablk, M.E. and C. Salisbury. 2011. Avalanche Dog Teams: Technical Experts in a Dangerous Environment. K9-Cop Magazine. Dec/Jan issue.

Panel moderator:

Panel Moderator: *K9-Science Panel Discussion for SAR K9 Handlers*. J.C. Sagebiel, L. Lit, M.E. Cablk. National Association of Search and Rescue. 2011 Annual Conference. 2-4 June 2011, Sparks, NV.

Panel Chair for Session *Bases and Battlefields: Historical and Geographical Approaches to Military Landscapes*. American Society of Environmental History Conference. Phoenix, AZ. April 12-17, 2011.

Presentations (Invited):

Cablk, M.E. K9 Evidence in the Courtroom. First Annual CLE conference, Vernal, UT. August 809, 2019.

Cablk, M.E. Seeing is believing. Science Distilled, Reno, NV. March 20, 2018. (Public speaking engagement on science of K9 perception and attention)

Cablk, M.E. Wildfires in a Developed Matrix: The Butte and Valley Fires. DRI Wildland Fire Science Center Inaugural Meeting. November 13, 2015.

Cablk, M.E. Double blind training for cadaver dog handlers. Little Basin, CA. State of California Search and Rescue Conference. September 6-8, 2013.

Cablk, M.E. The Mojave Desert Tortoise: Harbinger or beacon of the western US deserts? School of Forestry and Wildlife Science Fall 2012 Seminar Series. Auburn University, AL. October 9, 2012.

Cablk, M.E. Old wives tails and SAR: how to improve your credibility as a handler. State of California Search and Rescue Conference. Coloma, CA. September 7-9, 2012.

Cablk, M.E. Military wilderness: If a bomb drops in the desert do we still call it wilderness? American Society of Environmental History Conference. Phoenix, AZ. April 12-17, 2011.

Cablk, M.E. Integrating GIS with field methods to establish use patterns of the American marten at a major American ski destination. Invited seminar at the Volcani Institute, Agricultural Research Organization, Bet Dagan, Israel. March 22, 2010.

Cablk, M.E. Experiencing nature in militarized landscapes: If a bomb drops in the desert do we still call it wilderness? American Association of Geographers Annual Meeting. March 22-27, 2009. Las Vegas, Nevada.

- Cablk, M.E. Experiencing nature in militarized landscapes: If a bomb drops in the desert do we still call it wilderness? University of Nevada Reno Literature and Environment Colloquium. March 27, 2009. Reno, NV.
- Cablk, M.E. Militarized Landscapes Conference. Experiencing nature in military landscapes: If a bomb drops on the desert do we still call it 'wilderness'? University of Bristol, Bristol, England. 3-6 September 2008.
- Cablk, M.E. Quantifying detection dog team capability in the field deployment setting. in Odour detection by animals: Research and Practice. Ulven Camp, Oslo, Norway, 16-20 June 2008.
- Cablk, M.E., J.S. Heaton, K.E. Nussear, T.C. Esque. Using dogs to find small desert tortoises: an update of the DTK9 Program 2006 field effort. 32nd Desert Tortoise Council Symposium. February 23-25, 2007. Las Vegas, NV.
- Cablk, M.E. Working with Nature: Dogs and Tortoises. Native American Land Conservancy Annual Conference. February 8-10, 2007. El Cajon, CA.
- Cablk, M.E. Stress in Wildlife: The American Marten at Heavenly Ski Area. Western Occupational Health Conference, September 14-16, 2006, Incline Village, NV.
- Cablk, M.E. and J.S. Heaton. 2006. The Desert Tortoise K9 Program. Desert Tortoise Council Meeting. February 19, 2006. Tucson, Arizona.
- Cablk, M.E. and J.S. Heaton. 2005. Using dogs to find desert tortoises. Desert Tortoise Science Advisory Council. May 16, 2005. Reno, NV.
- Cablk, M.E. and J.S. Heaton. 2005. Using K9s to find desert tortoises: The DTK9 Program. 4th National Detector Dog Conference. April 28-May 1, 2005. Auburn University College of Veterinary Medicine, Auburn, Alabama.
- Cablk, M.E. 2005. Predation Risks to wildlife from human and human-dog surveys. The Wildlife Society (western chapter) Annual Meeting. January 20-22, 2005, Sacramento, CA.
- Cablk, M.E. and J.S. Heaton. 2004. Using dogs to detect wildlife: Training, use and standards. *In* Scent detection by Sniffer Animals and Electronic Noses: Expert Workshop. C. Cox, ed. University of Sokoine, Morogoro, Tanzania. July 27-30th, 2004.
- Cablk, M.E. and J.S. Heaton. 2004. Using K9s to find desert tortoise: implications for military lands management. Annual Strategic Environmental Research and Development Program & Environmental Security Technology Certification Program Symposium and Workshop. November 30-December 2, 2004, Washington, D.C.
- Cablk, M.E. Wildlife detection dogs: Linkages across disciplines for developing standards. *At the* Workshop on scent detection: By sniffer animals and electronic noses. July 27-30th, 2004. Sokoine University of Agriculture, Morogoro, Tanzania.
- Minor, T. and M.E. Cablk. 2004. Estimation of hard impervious cover in the Lake Tahoe Basin using remote sensing and GIS. February 26, 2004. Presentation to the Tahoe Regional Planning Agency, Stateline, NV.
- Cablk, M.E. 2003. Remote Sensing and the Desert Tortoise: Considerations for linking technology, habitat and animals. September 4-5, 2003, Presentation to the Desert Tortoise Recovery Plan Assessment Committee Meeting. Monterey Bay, CA.
- Cablk, M.E. 2002. Student Immersion Program in Education and Research (SIPER) Science Fridays. 15 July-19 July. University of California White Mountain Research Station, Bishop, CA.

- Cablk, M.E. 2001. Decomposing the Problem: Encroachment and Risk. The Partners in Technology Environmental Technology Technical Symposium and Workshop. Washington, D.C. November 26-29th, 2001.
- Cablk, M.E. 2001. Military Ecology: the role of military installations for conservation of biological diversity. 3rd UC Summer Symposium in Conservation Biology: Conserving biodiversity in temperate and tropical regions – challenges and approaches. August 12-17, 2001.
- Cablk, M.E. 2001. Technology for Landscape Studies. National Science Foundation Research Education for Undergraduate Program. University of California White Mountain Research Station. Bishop, California.
- Cablk, M.E. 2000. Basic Image Processing Methods for Desert Environments: change detection for the Mojave Desert, California. DoD Multidisciplinary University Research Initiative program (MURI). Annual Meeting.
- Cablk, M.E. and D. Mouat. 1999. Designing the future: A framework for environmental management on DoD lands within the California Mojave Desert. Strategic Environmental Research and Development Program Review, China Lake Naval Air Weapons Facility, California.

Presentations (other):

- Cablk, M.E. 2019. K-9 Evidence in the Courtroom. *Presented at the 71st Annual American Academy of Forensic Sciences*, Baltimore, MD, February 18-23, 2019.
- Cablk, M.E. 2018. The dog alerts but there's no body: The Science of Human Remains Detection - K9 Evidence for the Courtroom. *Presented at the 70th Annual American Academy of Forensic Sciences*, February 19-23, 2018.
- Cablk, M.E. 2018. Search and Recovery of 42 Victims from the Oso Mudslide, Washington State. *Presented at the 70th Annual American Academy of Forensic Sciences*, February 19-23, 2018.
- Cablk, M.E. 2017. Detecting Human Remains in Fatal Fires Using Cadaver Dogs. American Academy of Forensic Sciences 69th Annual Meeting. Feb. 13-18, 2017. New Orleans, LA.
- Williams, A., E. Pope, M. Pilloud, M. Cablk and A. Galloway. 2017. Modeling Thermal Alterations on Burned Human Remains. American Academy of Forensic Sciences 69th Annual Meeting. Feb. 13-18, 2017. New Orleans, LA.
- Williams, A., E. Pope, M. Pilloud, M. Cablk and A. Galloway. FFDIC: Experimental Analysis of Burned Human Remains. Presented at the Mountain, Desert, and Coastal Forensic Anthropologists Annual Meeting, May 25, 2016.
- Holz, B.A. and M.E. Cablk. 2013. Comparing historical human remains detection dog and ground penetrating radar responses in areas of possible human burials. Seventh World Archaeological Congress, January 13-18, 2013. Dead Sea, Jordan.
- Cablk, M.E. 2011. *Bridging SAR dogs and science – the latest and greatest, translated*. National Association of Search and Rescue. 2011 Annual Conference. 2-4 June 2011, Sparks, NV.
- Miller, J. J., French, R. H., Mizell, S. A., Kratt, C., Cablk, M. E., 2011: Using Doppler Radar Precipitation Measurements to Enhance Estimates of Playa Inundation, International Conference on Military Geoscience: Las Vegas, NV.
- Miller, J.J., R.H. French, S.A. Mizell, M.E. Cablk, and C.B. Kratt. 2011. Using Doppler Radar Precipitation Measurements to Enhance Estimates of Playa Inundation. American Society of Civil

- Engineers - Environmental and Water Resources Institute, World Environmental and Water Resources Congress 2011, May 22-26, 2011, Palm Springs, California.
- Cablk, M.E., T.C. Esque, K.E. Nussear, J.S. Heaton, C. Valentin, R.S. Harmon, S.S. Clark, A. Hurt. How capability studies validate wildlife detection dog teams as a legitimate survey tool. The Wildlife Society 17th Annual Conference. October 2-6, 2010. Snowbird, UT.
- Cablk, M.E. GIS data fusion to support conservation of *Martes americana*, the American marten, at a Lake Tahoe Ski area. Society for Conservation GIS Annual Meeting. July 8-11, 2010. Monterey, CA.
- Cablk, M.E. and J.C. Sagebiel. Field capability of dogs to locate individual human teeth. American Academy of Forensic Sciences 62nd Annual Meeting. February 22-27, 2010. Seattle, WA.
- Cablk, M.E., T. Esque, K. Nussear, S. Clark, C. Valentin, R.S. Harmon. Operational standards for deployment of desert tortoise detection dog teams. The Partners in Technology Environmental Technology Technical Symposium and Workshop. December 1-3, 2009. Washington, DC.
- Cablk, M.E. K. Nussear, T. Esque, C. Valentin, R.S. Harmon, S. Clark. Final Assessment of DTK9 Teams – Results from the 2008 Field Tests. The Partners in Technology Environmental Technology Technical Symposium and Workshop. December 2-4, 2008. Washington, DC.
- Cablk, M.E. and C. Raumann. Urbanization effects on the forests of Lake Tahoe (1940-2002). In Society of American Foresters 2008 National Convention. Forestry in a Climate of Change. Reno-Tahoe, Nevada. November 5-9, 2008.
- Cablk, M.E., R.S. Harmon and C. Valentin. Maintaining real-time calibration of detection dog teams during field deployment given uncertainty in target location. The Partners in Environmental Technology Technical Symposium and Workshop: Meeting DOD's Environmental Challenges. December 4-6, 2007. Washington, D.C.
- Cablk, M.E., J. Zhu, C. Kratt, R. Jasoni, M. Young, J. Thomas, J. Arnone III. Multi-scale remote sensing observations as a basis for estimating Evapotranspiration across the eastern Great Basin Desert, Nevada. American Geophysical Union 2006 Fall Meeting. December 11-15, 2006, San Francisco, CA. (poster)
- Cablk, M.E. J.S. Heaton, K. Nussear, T. Esque, S. Clark, K. Nagy, and C. Valentin. The Desert Tortoise K9 (DTK9) Program – Validation and demonstration. The Partners in Technology Environmental Technology Technical Symposium and Workshop. November 28-30, 2006. Washington, DC.
http://www.serdp-estcp.org/Symposium/posters/upload/30-W_Cablk-2.pdf
- Thomas, J., J. Reuter, A. Heyvaert, S. Chandra, and M. Cablk. 2006. The delicate environmental balance of Lake Tahoe: Ramification for public Health. Invited speakers for a joint presentation at the Western Occupational and Environmental Medical Association Annual Conference, Incline Village, NV. September 2006.
- Cablk, M., J. Heaton, T. Esque, and K. Nussear. Humans vs. K9s: Is fear warranted in the race to save the desert tortoise? 91st Annual Ecological Society of America, August 6-11, 2006, Nashville, TN.
- Raumann, C.G. and M.E. Cablk. 2006. Land Cover Change in the Southern Lake Tahoe Basin, 1940-2002. 3rd Biennial Conference on Tahoe Environmental Concerns. October 18-20, 2006. Incline Village, NV.
- Cablk, M.E. and J.S. Heaton. 2004. Using K9s to survey for desert tortoise. 89th Annual Ecological Society of America Meeting. August 1-6th, 2004. Portland, OR.
- Heaton, J.S., M.E. Cablk and R. Inman. 2004. The efficacy and reliability of dogs to locate desert tortoises under natural conditions. 18th Annual Meeting of the Society for Conservation Biology. July 30-August 2nd, 2004. NY, NY.

- Cablk, M.E. and T. Minor 2003. Watershed-based science: integrating impervious cover into analyses for the Lake Tahoe Basin, CA. 2003 Seattle Annual Meeting of the Geological Society of America (November 2-5, 2003).
- Cablk, M.E. and T. Minor. 2001. Analysis of impervious cover in the Lake Tahoe Basin for conservation of natural resources. 86th Annual Ecological Society of America. August 5 – 8th, 2001, Madison, WI.
- Heaton, J.S., M.E. Cablk (presenter), A.R. Kiester, and D. Mouat. 2000. A geomorphological approach to reptile habitat relationships in the California Mojave Desert: The LizLand Model. 85th Annual Ecological Society of America Snowbird, Utah, August 6-10th, 2000.
- Stevenson, M.R., R.E. Toth, T.C. Edwards Jr., L. Hunter, R.J. Lilieholm, K.S. Karish, J. DeNormandie, M. Gonzalez and M. Cablk. 2000. What if...? Alternative Futures for the California Mojave Desert. Proceedings of the 2000 ESRI International User Conference.
<http://proceedings.esri.com/library/userconf/proc00/professional/papers/pap192/p192.htm>
- Cablk, M.E., J.S. Heaton, R.J. Lilieholm, M.de J. Gonzalez, M. Stevenson, and D. Mouat. Military Ecology: The role of the Defense Department in protecting and preserving our biotic resources and challenges for civilian researchers in this realm. In D. Brunkhorst, ed., *Landscape Futures: An international symposium on advances in research for natural resource planning and management across regional landscapes*. Armidale, NSW, Australia. 22-25 September 1999. ISBN 1 8639 664 3.
- Heaton, J.S. and M. Cablk (presenter), 1999: All creosote bushes look alike at a 1m spatial resolution: Is airborne videography an appropriate source of data to assess habitat in the Mojave Desert, CA? In Proceedings from the 1999 ASPRS Annual Conference. Portland, OR, May 17-21, 1999.
- Heaton, J.S., A.R. Kiester, D. Mouat, and M.E. Cablk, 1999. A landscape scale, terrain based approach to reptile habitat in the Mojave Desert, California. American Association of Geographers, Honolulu, Hawaii. March 23-27, 1999.
- Cablk, M.E., D. Mouat, P. Hickman. 1999. Monitoring landscape change with timeseries Landsat data at Ft. Irwin, CA. in Proceedings of the 13th International ERIM Applied Geologic Remote Sensing Conference. Vancouver, BC. March 1-3, 1999.
- Ripple, W.J., M. Cablk, M. Bowdon, and J. D. Kushla. 1995. Monitoring landscape fragmentation with a Geographic Information System. in Proceedings of the 2nd Annual Wildlife Society Conference. Portland, OR. September 12-17, 1995.
- Michener, W.K., B. Kjerfve, L.R. Gardner, E.R. Blood, M. Cablk, W.H. Jefferson, D.A. Karinshak. 1991. GIS assessment of large-scale ecological disturbances (Hurricane Hugo 1989). in Proceedings of the 5th annual GIS/LIS conference. Atlanta, Georgia. October 28-November 1, 1991.

Scientific outreach/Interviews in popular and news media

Facebook Professional Page: www.facebook.com/DrCablk

Twitter Professional Page: #DrCablk

KOLO News Channel 8: <https://www.kolotv.com/content/news/Grim-work-Cadaver-dogs-key-in-search-for-fire-victims-501096221.html>

California Office of Emergency Services News: <http://www.oesnews.com/8786-2/>

Professional Blog *The Science of Sniffer Dogs* <http://www.dri.edu/mary-cablk-research/science-of-sniffer-dogs-blog>

NY Daily News: <http://www.nydailynews.com/news/crime/cadaver-dogs-investigators-sniff-human-remains-article-1.3324830>. July 13, 2017.

Wyoming Tribune Eagle article: http://www.wyomingnews.com/news/search-for-missing-cheyenne-boy-in-lccc-pond-manure-pile/article_b97c5086-ac90-11e6-b032-f37c7f4b4e50.html. November 17, 2016

C&E News Podcast: <https://www.youtube.com/watch?v=EffqGKU11qE>

Scientists Sniff for Death's Aroma. Chemical and Engineering News, v94(14) p. 16-18. April 4, 2016.
<http://cen.acs.org/articles/94/i14/Scientists-search-deaths-aroma.html>

CBC News Canada: <http://www.cbc.ca/news/canada/cadaver-dogs-science-training-1.3654993>

<http://www.suecoletta.com/a-dogs-nose-why-they-can-detect-odors/>

New York Times Magazine: http://www.nytimes.com/2015/06/21/magazine/how-to-train-a-cadaver-dog.html?_r=0

Scientific American: <http://blogs.scientificamerican.com/dog-spies/2013/09/25/one-day-you-will-smell-like-a-dead-chicken/>

The Daily Beast article: <http://www.thedailybeast.com/articles/2013/11/14/dog-orders-cavity-search-lawsuits-ensue.html?url=/articles/2013/11/14/dog-orders-cavity-search-lawsuits-ensue.html>

Featured in "What the dog knows: the science and wonder of working dogs" by Cat Warren published 2013 (www.catwarren.com) by Simon&Schuster.

Jet Life Nigeria article: <http://www.jetlifenigeria.com/2013/07/dogs-a-vital-aid-to-aviation-security/>

National Geographic News article: <http://news.nationalgeographic.com/news/2013/04/130407/detection-dogs-learning-to-pass-the-sniff-test/>

Desert Tortoise K9 Program featured in popular media:

- Poop Detectives: Working Dogs in the Field by Ginger Wadsworth. Published by Charlesbridge, October 11, 2016. 80 pp. <https://www.amazon.com/Poop-Detectives-Working-Dogs-Field/dp/1580896502>
- National Geographic Kids Magazine
- Children's book: Surviving Death Valley: Desert Adaptation by Pamela Dell. ISBN-10: 1429612665. 32 pages
- RLife Magazine
- Delta Sky Magazine
- Audubon Magazine (<http://archive.audubonmagazine.org/fieldnotes/fieldnotes0505.html>)
- Dog World Magazine (Apr2005, Vol. 90 Issue 4, p8)
- Reptiles Magazine
- Australian Working Dog Magazine
- High Country News
- Las Vegas Sun
- DRI Newsletter
- UNR Silver & Blue
- Local Television News (Cablk interview with Bill Brown)
- Local National Public Radio
- Oregon Statesman Journal